

2223

**CERTIFICATION DESIGN LETTER
FOR AREA 8, PHASE II
AND AREA 6 TRIANGLE AREA**

**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO**



INFORMATION
ONLY

MARCH 1999

**U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE**

**21100-RP-0001
REVISION 0
FINAL**

/

TABLE OF CONTENTS

2223

Executive Summary	ES-1
1.0 Introduction	1
1.1 Objectives	1
1.2 Scope	1
2.0 Historical and Precertification Data	3
2.1 Historical Data	3
2.2 Precertification Data	3
3.0 Area-Specific Constituents of Concern	6
3.1 Selection Criteria	6
3.2 ASCOC Selection Process for A8P2	7
3.3 ASCOC Selection Process for the Area 6 Triangle Area	7
4.0 Certification Approach	8
4.1 Certification Design	8
4.2 Analytical Methodology and Statistical Analysis	9
4.3 Railroad Corridor Drainage Investigation	10
5.0 Schedule	11
References	R-1

LIST OF TABLES

Table 1	Historical Data Collected from Area 8, Phase II and the Area 6 Triangle Area
Table 2	ASCOC List for All A8P2 and A6TA CUs

LIST OF FIGURES

Figure 1	Area 8, Phase II and Triangle Area Location Map
Figure 2	A8P2 and Triangle Area Topography and Surface Features
Figure 3	Historical Borings within A8P2 and the Triangle Area
Figure 4	Mobile NaI Total Activity Results and Phase I HPGe Readings Locations
Figure 5	Mobile NaI and Phase I HPGe Total Uranium Results
Figure 6	Mobile NaI and Phase I HPGe Thorium-232 Results
Figure 7	Mobile NaI and Phase I HPGe Radium-226 Results
Figure 8	Mobile NaI and Phase II HPGe Reading Locations and Results
Figure 9	Certification Units Identified Within A8P2 and the Triangle Area
Figure 10	A8P2 and Triangle Area Sub-CUs and Certification Sampling Locations

2223

LIST OF ACRONYMS AND ABBREVIATIONS

A6TA	Area 6 Triangle Area
A8PI	Area 8, Phase I
A8P2	Area 8, Phase II
ASCOC	area-specific constituent of concern
ASL	analytical support level
BTX	benchmark toxicity value
CDL	Certification Design Letter
COC	constituent of concern
CU	certification unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRDL	Contract Required Detection Limit
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FRL	final remediation level
HPGe	high purity germanium detector
mg/Kg	milligram per kilogram
NaI	sodium iodide
OEPA	Ohio Environmental Protection Agency
OU5	Operable Unit 5
pCi/g	picoCuries per gram
ppm	parts per million
PSP	Project Specific Plan
RSS	Radiation Scanning System
RTRAK	Radiation Tracking System
ROD	Record of Decision
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
UCL	Upper Confidence Limit
V/FCN	Variance/Field Change Notice

EXECUTIVE SUMMARY

This Certification Design Letter (CDL) describes the certification approach for Area 8, Phase II (A8PII) and the Area 6 "Triangle Area." The following information is included:

- A definition of the boundaries of the areas to be certified under the guidance of this CDL
- A presentation of historical data and newly acquired precertification real-time data
- A discussion of the area-specific constituent of concern (ASCOC) selection process and list of ASCOCs assigned to A8PII and the Area 6 Triangle Area (A6TA).
- A presentation of the certification unit (CU) boundaries and proposed sampling strategy
- The analytical requirements and the statistical methodology that will be employed
- The proposed schedule for the certification activities.

The scope of this CDL is limited to A8PII and the southern portion of the A6TA. A8PII is an 18.56-acre plot of land on the northwest corner of the site, and the A6TA is the portion of the Fernald Environmental Management Project (FEMP) property located west of Paddys Run Road. The northern portion of this land (the railroad track corridor) will be certified after completion of Waste Pit remediation, since rail shipments of contaminated material will be shipped across the rail line as part of remediation. These perimeter areas of the site are located upwind of the Former Production Area. While few historical soil samples were collected in these areas, a review of these data shows that no soil contamination was found to exceed any of the final remediation levels (FRLs), and no remedial action is required. This conclusion is supported by the precertification data collected using real-time gamma sensitive field instruments.

The certification design presented in this CDL follows the general approach outlined in Section 3.4 of the Sitewide Excavation Plan (SEP) (DOE 1998a). The selection of Area 8 ASCOCs was accomplished using constituent of concern (COC) lists in the Operable Unit 5 (OU5) Record of Decision (ROD) (DOE 1996), process knowledge of the site COCs and release history. While the SEP identifies the Triangle Area as part of Area 6, it is also a perimeter area, and will be treated as such during certification. Therefore, this process will begin with precertification, and total uranium, thorium-228, thorium-232, radium-226, and radium-228 (the sitewide primary COCs) will be considered ASCOCs in

2223

FEMP-A8P11-A6TA-CDL-FINAL
21100-RP-0001, Revision 0
March 29, 1999

every CU in these areas. Field work is scheduled to begin in May 1999, and the Certification Report will be issued August 31, 1999.

1.0 INTRODUCTION

This CDL describes the certification approach for demonstrating that soil in A8P2 and the southern portion of the Area 6 Triangle Area (A6TA) meets the FRLs for all ASCOCs. The format of this CDL follows guidelines presented in the SEP. Accordingly, this CDL consists of six sections:

- 1.0 Introduction - Presentation of the purpose, objectives, and scope of this CDL
- 2.0 Historical and Precertification Data - Presentation and discussion of historical and precertification scanning data
- 3.0 Area-Specific Constituents of Concern (ASCOCs) - Discussion of selection criteria and ASCOCs for A8P2 and the A6TA
- 4.0 Certification Units (CUs) - Presentation of design, sampling and analytical methodologies
- 5.0 Schedule
- 6.0 References

1.1 OBJECTIVES

The primary objectives of this document are to:

- Define the boundaries of the area to be certified under the guidance of this CDL
- Present historical data and newly acquired real-time data in the form of data maps of the area proposed for certification
- Define the ASCOC selection process and list the selected ASCOCs for those areas
- Present the CU boundaries and proposed sampling strategy
- Summarize the analytical requirements and the statistical methodology that will be employed
- Present the proposed schedule for the certification activities.

1.2 SCOPE

The scope of this CDL is limited to A8P2 and the southern portion of the A6TA (Figure 1). A8P2 includes the extreme northwest corner of the FEMP, including a portion of the FEMP property west of Paddys Run and north of the railroad tracks. This 18.56-acre parcel of land is primarily a grazed pastureland that is sparsely vegetated with large trees, especially along the Paddys Run corridor. It is

relatively flat and slopes gently toward Paddys Run. The southeast corner of A8P2 lies within the Paddys Run 100-year floodplain. A prominent drainage ditch drains stormwater from an off-property agricultural area. This ditch runs through a culvert beneath Paddys Run Road and across A8P2 toward Paddys Run. A second drainage ditch in this area forms the southern boundary of A8P2 at the top of its north bank. This ditch drains some off-property soil along with the A6TA, which is the westernmost portion of the FEMP site. The A6TA is 6.90 acres in size, and is primarily a flat, open field that contains the railroad line leading to and from the site. The topography and surface features of these areas are shown in Figure 2. Based on site knowledge, it is unlikely that these areas have been impacted above the FRLs by FEMP production activities since they are located upwind of the Former Production Area and because Paddys Run effectively isolates the surface water drainage that impacted other areas of the site. In addition, historical aerial photographs indicate no production related land uses for this land, with the exception of transporting site materials across the A6TA via the railroad line.

The perimeter location of A8P2 makes it an ideal location for one of the initial FEMP natural resource restoration projects; therefore, it has been selected as the location for the Demonstration Forest Project. The conceptual design of the Demonstration Forest Project is currently underway, and project implementation is scheduled to begin in the spring of 2000, thus making A8P2 a priority for certification in 1999. Although the Triangle Area is part of Area 6, the southern portion of this area will be tied into the A8P2 certification effort so that its surface water drainage may be used in the A8P2 Demonstration Forest Project. Because shipments of Waste Pit material will be crossing railroad line in the northern portion of the A6TA, this soil will not be certified until after the Waste Pit remediation is complete and the rail line is removed.

Based on existing soil contamination data and the perimeter location of A8P2 and the A6TA, no soil excavation is anticipated to remove contaminated soil. Consequently, the remediation approach will follow Excavation Approach E, as discussed in Section 4.5 of the SEP. No Integrated Remedial Design Package will need to be submitted, and the certification process for these areas began with precertification scanning activities.

2223

2.0 HISTORICAL AND PRECERTIFICATION DATA

Prior to conducting precertification and certification activities, all soil demonstrated to contain contamination above the associated FRLs or other applicable action levels must be evaluated for remedial actions, in accordance with the SEP. The OU5 ROD also commits the FEMP to remove any man-made objects, including debris, building foundations, and drainage systems, before a remediation area can be certified. However, there are no such objects within A8PII or the A6TA.

2.1 HISTORICAL DATA

Before initiating certification, all historical soil data pertinent to A8PII and the A6TA were pulled from the Sitewide Environmental Database (SED) (Table 1). As was the case with Area 8, Phase I (A8PI), very few soil contamination data were collected from these areas (see Figure 3). In A8PII, four borings were conducted and five soil samples were analyzed, three of which were surface samples. In the A6TA, three borings were conducted and three soil samples were analyzed, none of which were surface samples. Target analytes included only radiological constituents, and all results indicated that concentrations are below the FRLs and within background range. These historical data are too sparse to accurately characterize A8PII and the A6TA, but there is no reason to believe that contamination in A8PII and the A6TA is much different than in A8PI. The comprehensive certification sampling and analysis program conducted in A8PI clearly demonstrated that soil contamination in western perimeter areas of the site is, as a whole, well below the FRLs. This information, along with the historical data from these areas, supports the conclusion that no soil contamination is anticipated in A8PII or the A6TA.

Finally, existing data collected from within A8PII and the A6TA were also reviewed against the benchmark toxicity values (BTVs) of each constituent of ecological concern, and no BTV exceedences were identified. This finding is consistent with the Sitewide Ecological Risk Assessment, which determined that there was no risk to ecological receptors in the area west of Paddys Run.

2.2 PRECERTIFICATION DATA

According to guidelines established in Section 3.3.3 of the SEP, precertification activities were conducted in A8PII to evaluate residual radiological contamination patterns. During precertification Phase 1, a surface radiation survey was conducted over most of A8PII and the A6TA. This was done

using mobile sodium iodide (NaI) detectors that include a 4x4x16-inch NaI detector mounted on a tractor (a.k.a. the Real Time Radiation Tracking System [RTRAK]), or on a cart (a.k.a. the Radiation Scanning System [RSS]). The RTRAK was used to collect information about surface soil contamination patterns over as much of A8PII and the A6TA as was accessible. The RTRAK could not access the wooded areas, so the RSS was used in its place. Because neither of these detectors are capable of accessing densely wooded areas or steep banks, supplemental high-purity germanium (HPGe) detector readings were collected in these inaccessible areas using the no overlap (90.6 percent coverage) option to assure that any elevated contamination areas were not missed. Due to snow cover and extremely wet soil conditions, precertification data could not be collected in some small areas. Details on the use and capabilities of the RTRAK, the RSS, and the HPGe are provided in the User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (DOE 1998b) and Addendum H to the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (DOE 1998c).

The A8PII/A6TA precertification Phase 1 mobile NaI detector scan showed total activity results to be similar to those identified in A8PI, and several small areas of higher activity were identified, as shown on Figure 4. Of note, there is a berm along the north and west boundaries of A8PII that resulted from borrow material being collected from the center of A8PII during plant construction in the early 1950s. The mobile NaI readings at the base of this berm in the excavated portion of A8PII showed lower overall total activity readings than other portions of A8PII. Since this excavation took place prior to FEMP production, this is believed to be a function of varying soil type.

The precertification Phase 1 mobile NaI results for total uranium and radium-226 were primarily below the FRLs of 82 ppm and 1.7 pCi/g, respectively, and all thorium-232 results were below the FRL of 1.5 pCi/g. While some isolated total uranium and radium-226 results exceeded the associated FRLs, no "potential hot spots" (i.e., mobile NaI results above 3x FRL) were identified. Mobile NaI and supplemental HPGe primary ASCOC results are shown on Figure 5 (total uranium), Figure 6 (thorium-232), and Figure 7 (radium-226). The mobile NaI ASCOC results presented in these figures are two-point averaged. All real-time results (RTRAK, RSS and HPGe) presented in this CDL have been moisture and radon corrected. Also, the worst case (84 percent) moisture correction for the cow

manure was applied to all A8P2 mobile NaI radium results, and still no result exceeded 3x FRL. Note that only the standard moisture correction was mapped.

After review of the precertification Phase 1 mapped data, and considering other factors discussed in Section 3.4.1 of the SEP, CUs were then established before beginning precertification Phase 2. The next step of precertification was to investigate the areas where the mobile NaI scan identified higher total activity levels. These locations (minimum 1 per CU) were then identified for Phase 2 HPGe readings (see Variance/Field Change Notice (V/FCN) 21100-PSP-0001-4). The results of these readings showed that the three target ASCOCs are present at concentrations well below their respective FRLs at both detector heights. The locations and results of these measurements are shown in Figure 8. Because no two-point moving average RTRAK results were above 3x FRL, no Phase 2 hot spot confirmation readings were necessary. All A8P2 and A6TA precertification data are accessible through the SED.

3.0 AREA-SPECIFIC CONSTITUENTS OF CONCERN

In the OU5 ROD, there are 80 soil COCs with established FRLs. These COCs were retained for further investigation based on a screening process that considered the presence of the constituent in site soil and the potential risk to a receptor exposed to soil containing this contaminant. In spite of the conservative nature of this COC retention process, many of the COCs with established FRLs have a limited distribution in site soil or the presence of the COC is based on high Contract Required Detection Limits (CRDLs). When FRLs were established for these COCs in the OU5 ROD, the FRLs were initially screened against site data presented on spatial maps to establish a picture of potential remediation areas.

By reviewing existing Remedial Investigation/Feasibility Study data presented on spatial distribution maps, it was possible to reduce the sitewide list of soil COCs from 80 listed in the OU5 ROD to 30. This reduction was possible because the majority of the COCs with FRLs listed in the OU5 ROD have no detections on site above their corresponding FRL, thus eliminating them from further consideration. The 30 remaining sitewide COCs account for over 99 percent of the combined risk to a site receptor model, and they comprise the list from which all of the remediation ASCOCs are drawn. When planning certification for a remediation area, additional selection criteria are used to derive a subset of these 30 COCs. This subset of COCs is passed along to the certification process.

3.1 SELECTION CRITERIA

The selection process for retaining ASCOCs for a remediation area is driven by applying a set of decision criteria. A soil contaminant will be retained as an A8P2 ASCOC if:

- It is listed as a soil COC in the OU5 ROD
- It can be traced to site use, either through process knowledge or known release of the constituent to the environment
- Analytical results indicate the contaminant is present at a concentration above its FRL, and the above-FRL concentrations are not attributable to false positives or elevated CRDLs
- Physical characteristics of the contaminant, such as degradation rate and volatility, indicate it is likely to persist in the soil between time of release and remediation.

- The contaminant is one of the sitewide primary COCs (total uranium, radium-226, radium-228, thorium-232, and thorium-228).

3.2 ASCOC SELECTION PROCESS FOR A8PII

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary COCs, and will be retained as ASCOCs for this reason. As discussed in Section 2.1, historical data and the extensive A8PI certification analytical results show very little above-FRL contamination in western portions of the site, and none of immediate concern. Based on these factors and the inability to identify any mechanism for secondary COC contamination of A8PII, only the sitewide primary COCs will be retained as the A8PII ASCOCs.

3.3 ASCOC SELECTION PROCESS FOR THE AREA 6 TRIANGLE AREA

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary COCs, and will be retained as ASCOCs for this reason. While the SEP lists numerous secondary ASCOCs associated with Remediation Area 6 in Table 2-7, these ASCOCs are associated with the Waste Pits, the source of Area 6 contamination. Based on process history, there is no reason to believe that any of these secondary ASCOCs are present at concentrations above the FRL in the A6TA. As discussed in Section 2.1, this land is located along the site perimeter, and should be treated accordingly. Therefore, the secondary ASCOCs will not be retained for certification sampling in the A6TA, and certification samples will be analyzed for only the five primary ASCOCs.

2223

4.0 CERTIFICATION APPROACH

4.1 CERTIFICATION DESIGN

The certification design for A8P11 and the A6TA follows the general approach outlined in Section 3.4 of the SEP. As discussed in Section 3.0 of this document, total uranium, thorium-228, thorium-232, radium-226, radium-228 (the primary ASCOCs) will be retained in all CUs as the only CU-specific ASCOCs. Because A8P11 and the A6TA are considered to be "nonimpacted areas" of the site, Approach E from the SEP will be used as a basis for certification design, as described in Section 4.5 of the SEP. Group 2 CUs, which can be as large as 250,000 square feet, have been located within these areas as follows:

- **CU A8P11-01** (131,562 ft²) - established to generally cover the berm of native soil along parts of the north and west boundary of A8P11.
- **CU A8P11-02** (248,860 ft²) - established to generally cover the portion of A8P11 where borrow material was excavated during construction of the FEMP. The precertification scan generally revealed lower total activity readings in these areas.
- **CU A8P11-03** (246,354 ft²) - established to cover the east-central portion of A8P11, including a large portion of the property along Paddys Run.
- **CU A8P11-04** (181,677 ft²) - established to contain the southern portion of A8P11 separated by the drainage ditch.
- **CU A6TA-01** (153,064 ft²) - established to contain the southern portion of the A6TA.

Figure 9 shows the location and boundaries of these five CUs. As discussed in Section 1.0, the northern portion of the A6TA (the railroad corridor) will not be included in the scope of this CDL.

The selection of certification sampling locations was conducted according to Section 3.4.2 of the SEP. Each CU was first divided into 16 approximately equal sub-CUs. Sample locations were then generated by randomly selecting an easting and northing coordinate within the boundaries of each sub-CU, and testing the locations against the minimum distance criterion for the CU. If this was the case, an alternative random location was selected for that sub-CU, and all the locations were re-tested. This process continued until all 16 random locations met the minimum distance criterion. The sub-CUs and selected A8P11 certification sampling locations are shown in Figure 10.

The allowable minimum distance between pairs ranged from 45.3 feet in CU A8P2-01 to 62.3 feet in CU A8P2-02. Of note, it is possible that subsurface obstacles (e.g., buried rocks or tree roots) could prevent collection at the planned location. If this is the case, the location can be moved up to three feet from the original location, as long as it remains within the same CU and sub-CU boundary. A check of the minimum distances between locations reveals that such a move would not cause a violation of the minimum distance criterion for even the closest of location pairs. A move of more than three feet would require a minimum distance recheck and approval from the U.S. Environmental Protection Agency (EPA) and Ohio Environmental Protection Agency (OEPA).

As discussed in the Project Specific Plan (PSP) for Area 8, Phase II and A6TA Certification Sampling (DOE 1999), discrete soil samples will be collected from each of the 16 random sampling locations. Each sample will be collected from the 0 to 6-inch (surface) soil interval at the designated and surveyed sample point. Of the 16 certification samples, a total of 12 will be submitted for analysis. In order to select the 12 samples to analyze but still provide good areal coverage, each CU was divided into quadrants, with each quadrant containing four sample locations. Three of the four samples from each quadrant were then randomly selected for analysis, resulting in a total of 12 samples analyzed per CU. The other four samples from each CU are to be archived and analyzed only if necessary.

4.2 ANALYTICAL METHODOLOGY AND STATISTICAL ANALYSIS

Laboratory analysis of certification samples will be conducted using an approved analytical method, as discussed in Appendix H of the SEP. Analyses will be conducted to Analytical Support Level (ASL) E, where all requirements are the same as ASL D except the minimum detection level for the selected analytical method must be at least 10 percent of FRL. All results will be validated to ASL B, and a minimum 10 percent of the results from each laboratory will be validated to ASL D. Because results are batched by CU, all results from one of the five CUs will be validated. Samples rejected during this validation will be reanalyzed, or an archive sample may be substituted if there is insufficient material available from the initial sample. If any sample fails this validation, all data from the laboratory with the rejected result will then be validated to determine the integrity of all data from that laboratory. Once data are validated as required, results will be entered into the SED and a statistical analysis will be performed to evaluate the pass/fail criteria for the each CU. The statistical approach is discussed in Section 3.4.3 and Appendix G of the SEP.

Two criteria must be met for the CU to be certified as passing. If the data distribution is normal or lognormal, the first criterion compares the 95 percent Upper Confidence Limit (UCL) on the mean of each primary COC to its FRL. On an individual CU basis, any ASCOC with the 95 percent UCL above the FRL results in that CU failing certification. If the data distribution is not normal or lognormal, the appropriate nonparametric approach discussed in Appendix G of the SEP will be used to evaluate the second criterion. The second criterion is related to the hot spot criterion that is currently being formulated by the EPA, the OEPA, and the U.S. Department of Energy (DOE). The certification under the scope of this CU will be subject to the agreed upon hot-spot criterion. When the given UCL on the mean for each COC is less than its FRL, and the hot-spot criterion is met, the CU has met both criteria and will be considered certified.

There are three conditions that could result in a CU failing certification: 1) high variability in the data set, 2) localized contamination, and 3) widespread contamination. Details on the evaluation and responses to these possible outcomes are provided in Section 3.4.5 of the SEP. When all CUs within the scope of this CDL have passed certification, a Certification Report will be issued. The Certification Report will be submitted to the regulatory agencies to receive acknowledgment that the pertinent operable unit remedial actions were completed and the individual CUs are certified to be released for interim or final land use. Section 7.4 of the SEP provides additional details and describes the required content of the Certification Report.

4.3 RAILROAD CORRIDOR DRAINAGE INVESTIGATION

While the railroad corridor in the A6TA is outside the scope of this CDL, four samples will be collected concurrently with the certification samples to further verify that the drainage from the railroad track corridor is not impacted, since it will be diverted through A8P2 after restoration. These samples will be collected from the base of the drainage ditch that runs along the north side of the railroad tracks. Of note, these samples will **not** be considered "certification samples," nor will any type of statistical analysis be performed on the results. However, these results will be reported to the Agencies in the Certification Report for A8P2 and the A6TA. Details of the locations, collection, analysis, and validation of these samples are presented in the PSP for A8P2 and A6TA Certification Sampling and Drainage Ditch Investigation.

2223

5.0 SCHEDULE

The following draft schedule shows key activities for the completion of the work within the scope of this CDL. The primary drivers for this schedule are agreements between DOE, EPA and OEPA on the schedule for initiating work on the Operable Unit 4 Dispute Resolution Habitat Area.

<u>ACTIVITY</u>	<u>TARGET DATE</u>
Submittal of Certification Design Letter	January 29, 1999*
Start of Field Work	May 3, 1999
Complete Field Work	May 17, 1999
Complete Analytical Work	June 28, 1999
Complete Data Validation and Statistical Analysis	July 30, 1999
Submit Certification Report	August 31, 1999*

- * Only the dates for submittal of the CDL and Certification Report are commitments to the EPA and OEPA. Other dates are internal target completion dates.

REFERENCES

U. S. Department of Energy, 1996, "Record of Decision for Remedial Action at Operable Unit 5," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U. S. Department of Energy, 1998a, "Sitewide Excavation Plan," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U. S. Department of Energy, 1998b, "User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site," Draft, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U. S. Department of Energy, 1998c, "In-Situ Gamma Spectrometry QA/QC Program," Draft, Appendix H of the Sitewide CERCLA Quality Assurance Project Plan, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U. S. Department of Energy, 1999, "Project Specific Plan for Area 8, Phase II and Area 6 Triangle Area Certification Sampling and Drainage Ditch Investigation," Revision 0, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

TABLE 1
Historical Data Collected from Area 8, Phase II and the Area 6 Triangle Area

Area	Parameter	Sample ID	Location	Date	Depth	Northing	Easting	Result	Qual.	Units	QA Type	FRL
A8P2	Cesium-137	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	0.7	J	pCi/g	NORMAL	1.4
A8P2	Cesium-137	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.2	UJ	PCI/G	DUPLICATE	1.4
A8P2	Neptunium-237	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	0.6	U	pCi/g	NORMAL	3.2
A8P2	Neptunium-237	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.6	UJ	PCI/G	DUPLICATE	3.2
A8P2	Plutonium-238	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	0.6	U	pCi/g	NORMAL	78
A8P2	Plutonium-238	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.6	UJ	PCI/G	DUPLICATE	78
A8P2	Plutonium-239/240	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	0.6	U	pCi/g	NORMAL	77
A8P2	Plutonium-239/240	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.6	UJ	PCI/G	DUPLICATE	77
A8P2	Radium-226	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	0.8	J	pCi/g	NORMAL	1.7
A8P2	Radium-226	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.5	UJ	PCI/G	DUPLICATE	1.7
A8P2	Radium-228	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	0.7	U	pCi/g	NORMAL	1.8
A8P2	Radium-228	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	1	UJ	PCI/G	DUPLICATE	1.8
A8P2	Ruthenium-106	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	1.1	UJ	pCi/g	NORMAL	NA
A8P2	Ruthenium-106	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	1.2	UJ	PCI/G	DUPLICATE	NA
A8P2	Strontium-90	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	0.5	UJ	pCi/g	NORMAL	14
A8P2	Strontium-90	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.5	UJ	PCI/G	DUPLICATE	14
A8P2	Technetium-99	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	1	U	pCi/g	NORMAL	30
A8P2	Thorium, Total	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	5.4721	NV	PCI/G	DUPLICATE	NA
A8P2	Thorium-228	005162	ZONE 3-540	12/8/87	0-0.167	484009.38	1345530.96	0.7	J	pCi/g	NORMAL	1.7
A8P2	Thorium-228	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	1.1	-	pCi/g	NORMAL	1.7
A8P2	Thorium-228	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.8	J	PCI/G	DUPLICATE	1.7
A8P2	Thorium-230	005162	ZONE 3-540	12/8/87	0-0.167	484009.38	1345530.96	1.5	J	pCi/g	NORMAL	280
A8P2	Thorium-230	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	1.4	-	pCi/g	NORMAL	280
A8P2	Thorium-232	005162	ZONE 3-540	12/8/87	0-0.167	484009.38	1345530.96	0.7	J	pCi/g	NORMAL	1.5
A8P2	Thorium-232	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	1	-	pCi/g	NORMAL	1.5
A8P2	Thorium-232	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.6	J	PCI/G	DUPLICATE	1.5
A8P2	Uranium, Total	005162	ZONE 3-540	12/8/87	0-0.167	484009.38	1345530.96	4.19796	J	mg/kg	NORMAL	82
A8P2	Uranium, Total	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	5.09753	-	mg/kg	NORMAL	82
A8P2	Uranium, Total	007003	2066	8/25/87	4.5-6.0	483968.32	1345234.41	2.69869	J	mg/kg	NORMAL	82
A8P2	Uranium, Total	007049	3066	9/17/87	100-101.5	483980.66	1345237.20	2.99854	J	mg/kg	NORMAL	82
A8P2	Uranium, Total	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	2.3639	NV	PCI/G	DUPLICATE	82
A8P2	Uranium-234	005162	ZONE 3-540	12/8/87	0-0.167	484009.38	1345530.96	1.9	J	pCi/g	NORMAL	N/A
A8P2	Uranium-234	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	1.5	-	pCi/g	NORMAL	N/A
A8P2	Uranium-234	007003	2066	8/25/87	4.5-6.0	483968.32	1345234.41	0.9	J	pCi/g	NORMAL	N/A
A8P2	Uranium-234	007049	3066	9/17/87	100-101.5	483980.66	1345237.20	0.9	J	pCi/g	NORMAL	N/A
A8P2	Uranium-234	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.6	UJ	PCI/G	DUPLICATE	N/A
A8P2	Uranium-235/236	005162	ZONE 3-540	12/8/87	0-0.167	484009.38	1345530.96	0.6	UJ	pCi/g	NORMAL	N/A
A8P2	Uranium-235/236	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	0.6	U	pCi/g	NORMAL	N/A

81

2223

TABLE 1
Historical Data Collected from Area 8, Phase II and the Area 6 Triangle Area

Area	Parameter	Sample ID	Location	Date	Depth	Northing	Easting	Result	Qual.	Units	QA Type	FRL
A8P2	Uranium-235/236	007003	2066	8/25/87	4.5-6.0	483968.32	1345234.41	0.6	UJ	pCi/g	NORMAL	N/A
A8P2	Uranium-235/236	007049	3066	9/17/87	100-101.5	483980.66	1345237.20	0.6	UJ	pCi/g	NORMAL	N/A
A8P2	Uranium-235/236	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.6	UJ	PCI/G	DUPLICATE	N/A
A8P2	Uranium-238	005162	ZONE 3-540	12/8/87	0-0.167	484009.38	1345530.96	1.4	J	pCi/g	NORMAL	N/A
A8P2	Uranium-238	005365	ZONE 3-541	4/23/88	0-0.167	484014.37	1345172.96	1.7	-	pCi/g	NORMAL	N/A
A8P2	Uranium-238	007003	2066	8/25/87	4.5-6.0	483968.32	1345234.41	0.9	J	pCi/g	NORMAL	N/A
A8P2	Uranium-238	007049	3066	9/17/87	100-101.5	483980.66	1345237.20	1	J	pCi/g	NORMAL	N/A
A8P2	Uranium-238	007066	3066	9/19/87	148-149.5	483980.66	1345237.19	0.7	J	PCI/G	DUPLICATE	N/A
A6TA	Uranium, Total	403451	11490	1/11/95	46.5	482849.37	1344520.00	2.051	-	mg/kg	NORMAL	82
A6TA	Uranium, Total	403462	11489	1/11/95	36	482849.16	1344522.80	2.68969	-	mg/kg	NORMAL	82
A6TA	Uranium, Total	403466	11488	1/11/95	6.5-7.0	482849.27	1344524.80	3.23843	-	mg/kg	NORMAL	82
A6TA	Uranium-234	403451	11490	1/11/95	46.5	482849.37	1344520.00	0.642	-	pCi/g	NORMAL	N/A
A6TA	Uranium-234	403462	11489	1/11/95	36	482849.16	1344522.80	0.764	-	pCi/g	NORMAL	N/A
A6TA	Uranium-234	403466	11488	1/11/95	6.5-7.0	482849.27	1344524.80	0.882	-	pCi/g	NORMAL	N/A
A6TA	Uranium-235/236	403451	11490	1/11/95	46.5	482849.37	1344520.00	0.1	U	pCi/g	NORMAL	N/A
A6TA	Uranium-235/236	403462	11489	1/11/95	36	482849.16	1344522.80	0.1	UJ	pCi/g	NORMAL	N/A
A6TA	Uranium-235/236	403466	11488	1/11/95	6.5-7.0	482849.27	1344524.80	0.1	U	pCi/g	NORMAL	N/A
A6TA	Uranium-238	403451	11490	1/11/95	46.5	482849.37	1344520.00	0.684	-	pCi/g	NORMAL	N/A
A6TA	Uranium-238	403462	11489	1/11/95	36	482849.16	1344522.80	0.897	-	pCi/g	NORMAL	N/A
A6TA	Uranium-238	403466	11488	1/11/95	6.5-7.0	482849.27	1344524.80	1.08	-	pCi/g	NORMAL	N/A

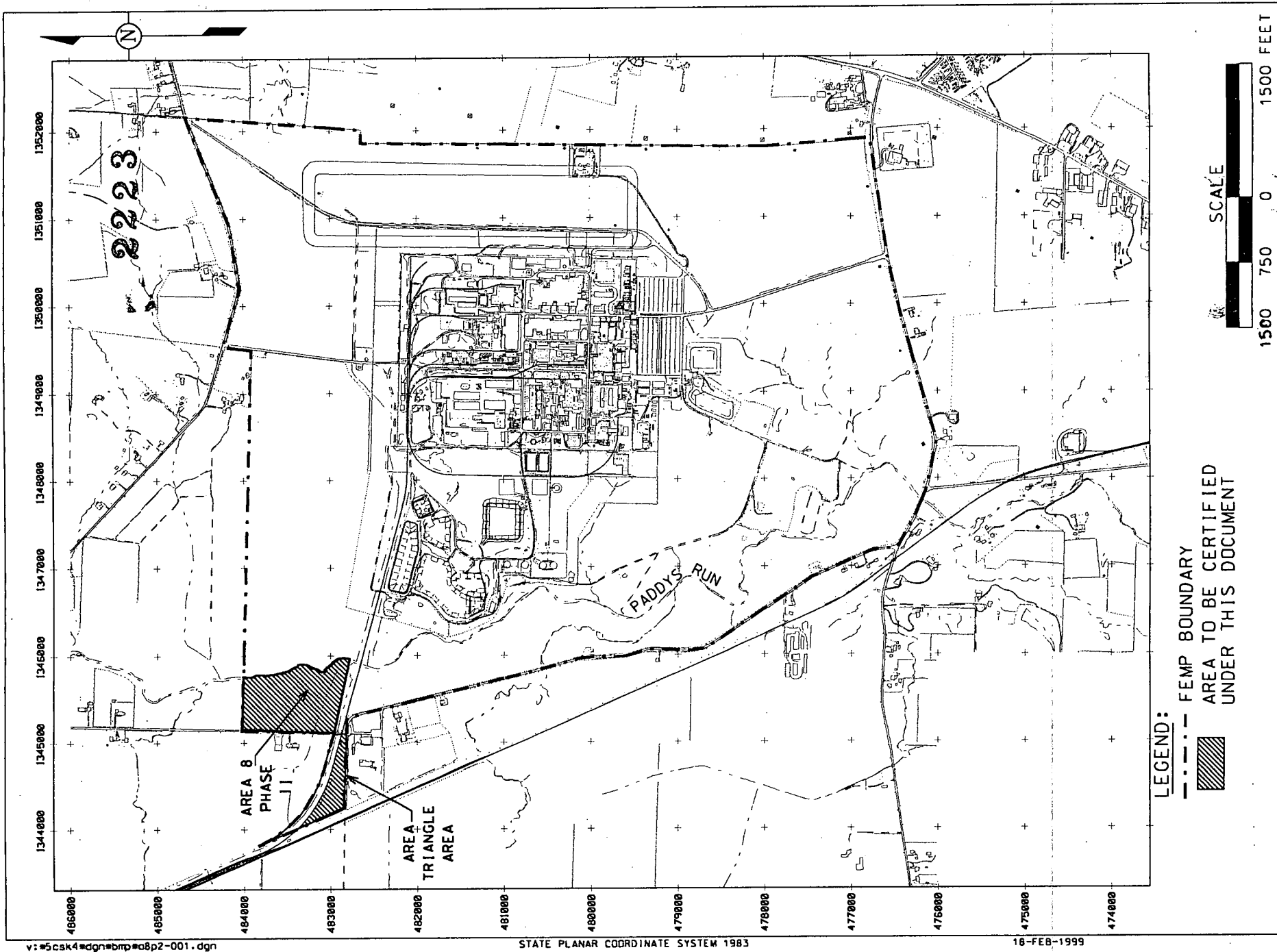
2223

19

TABLE 2
ASCOC LIST FOR ALL A8PII AND A6TA CUs

2223

ASCOC	FRL	Reason Retained
Total Uranium	82 mg/Kg	Retained as a primary ASCOC sitewide
Radium-226	1.7 pCi/g	Retained as a primary ASCOC sitewide
Radium-228	1.8 pCi/g	Retained as a primary ASCOC sitewide
Thorium-228	1.7 pCi/g	Retained as a primary ASCOC sitewide
Thorium-232	1.5 pCi/g	Retained as a primary ASCOC sitewide



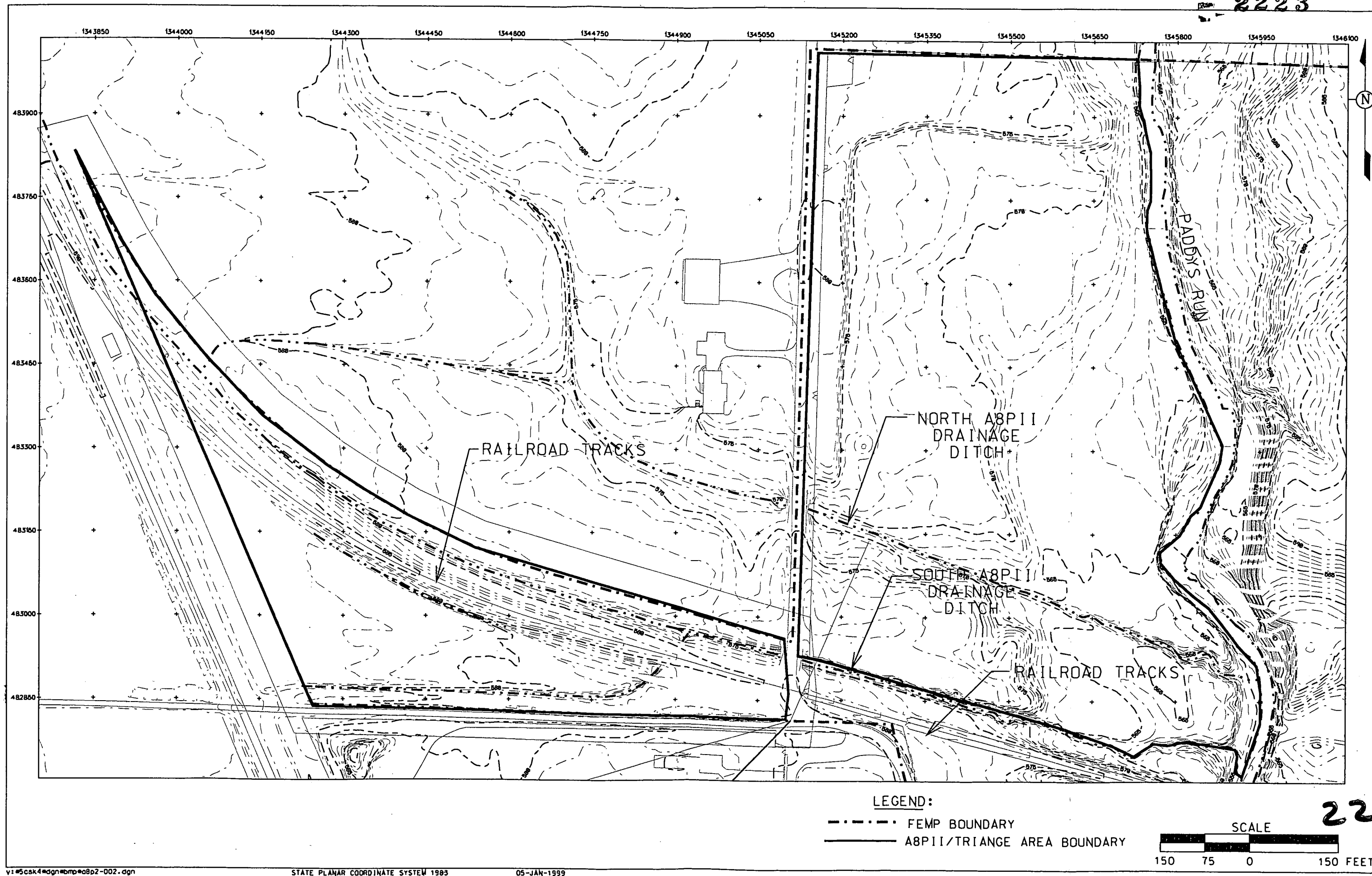


FIGURE 2. A8P11 AND TRIANGLE AREA
TOPOGRAPHY AND SURFACE FEATURES

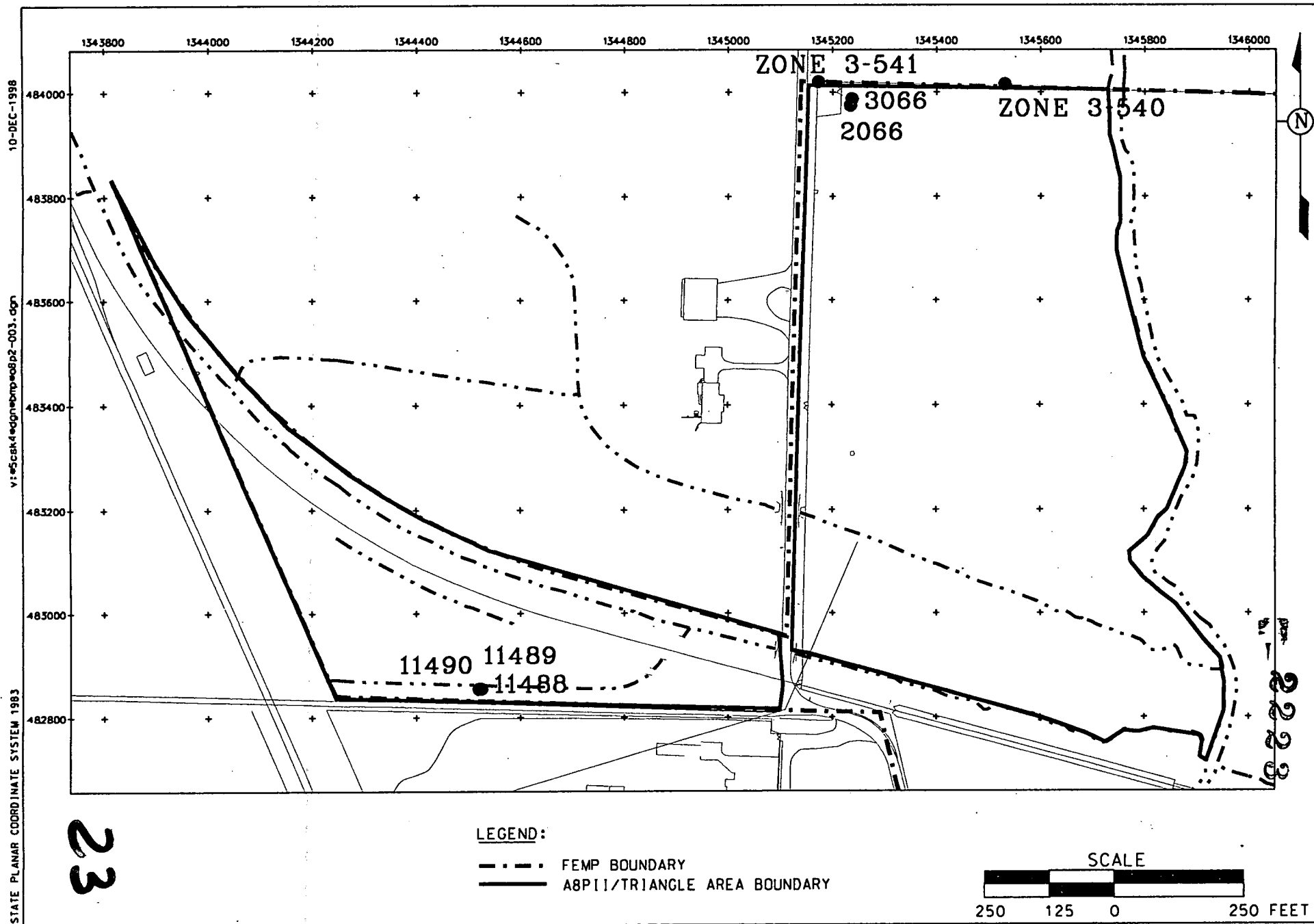


FIGURE 3. HISTORICAL BORINGS WITHIN A8P11 AND THE TRIANGLE AREA

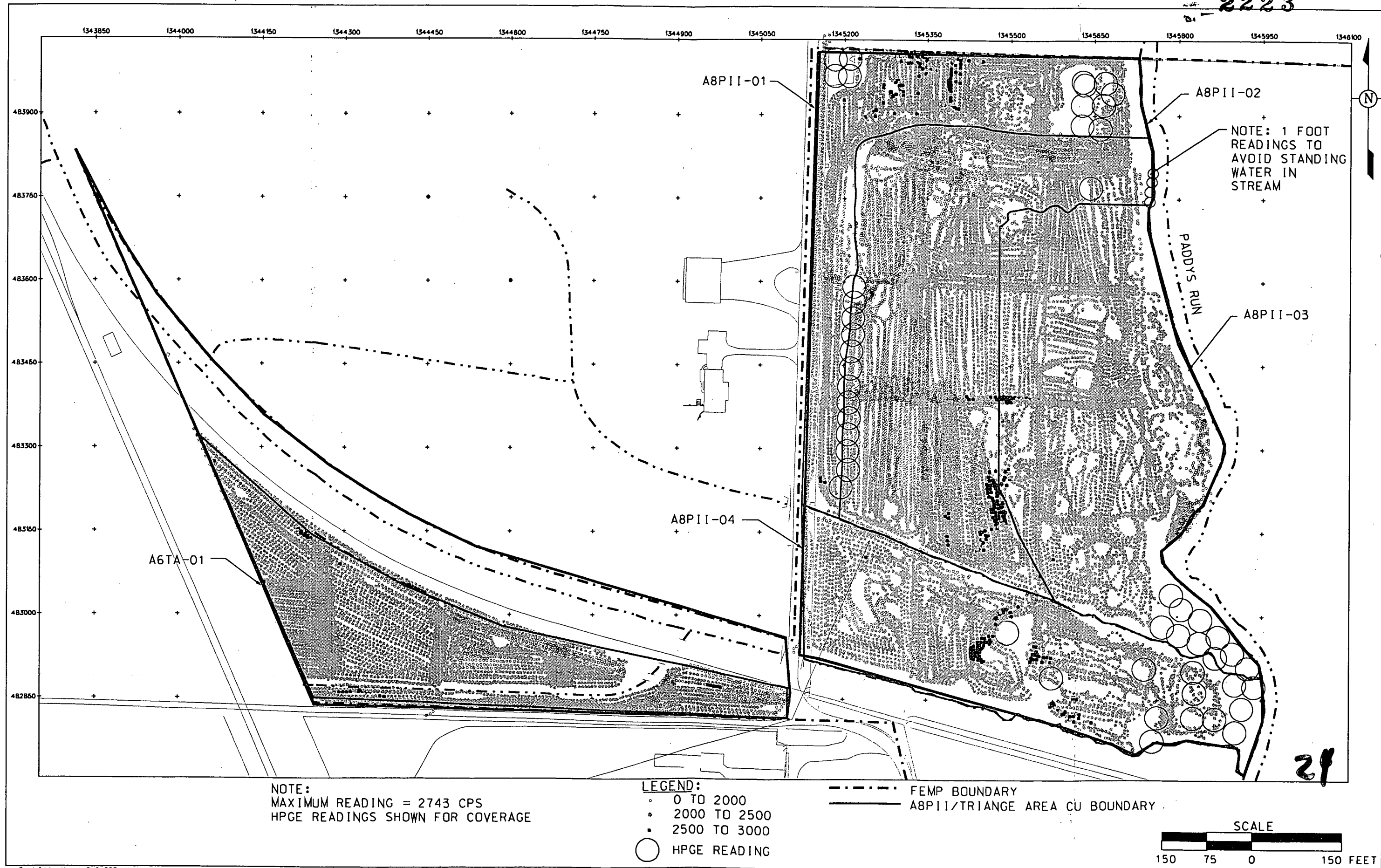


FIGURE 4. MOBILE NAI TOTAL ACTIVITY RESULTS AND PHASE I HPGE READINGS LOCATIONS

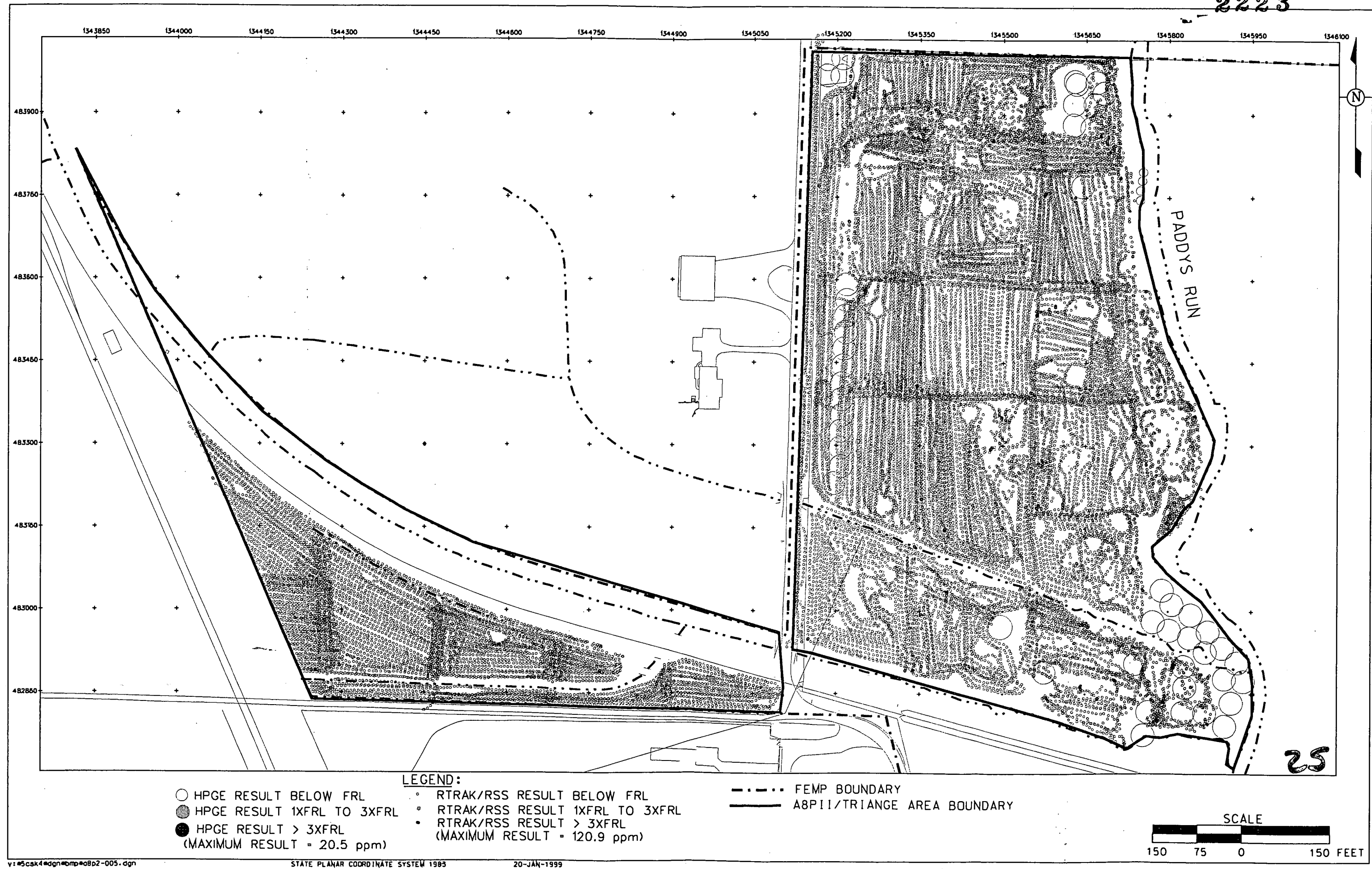


FIGURE 5. MOBILE NAI AND PHASE 1 HPGE TOTAL URANIUM RESULTS

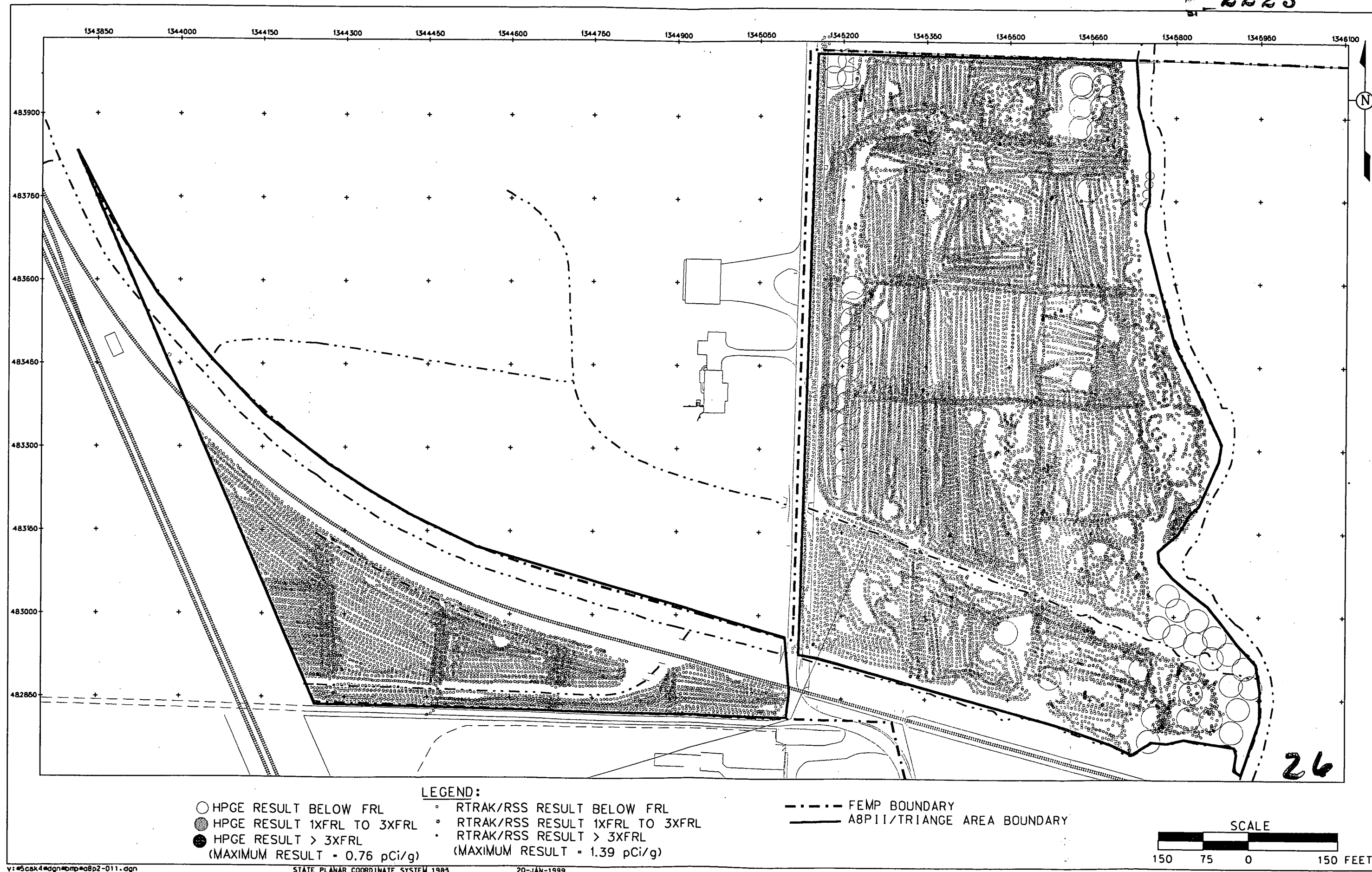
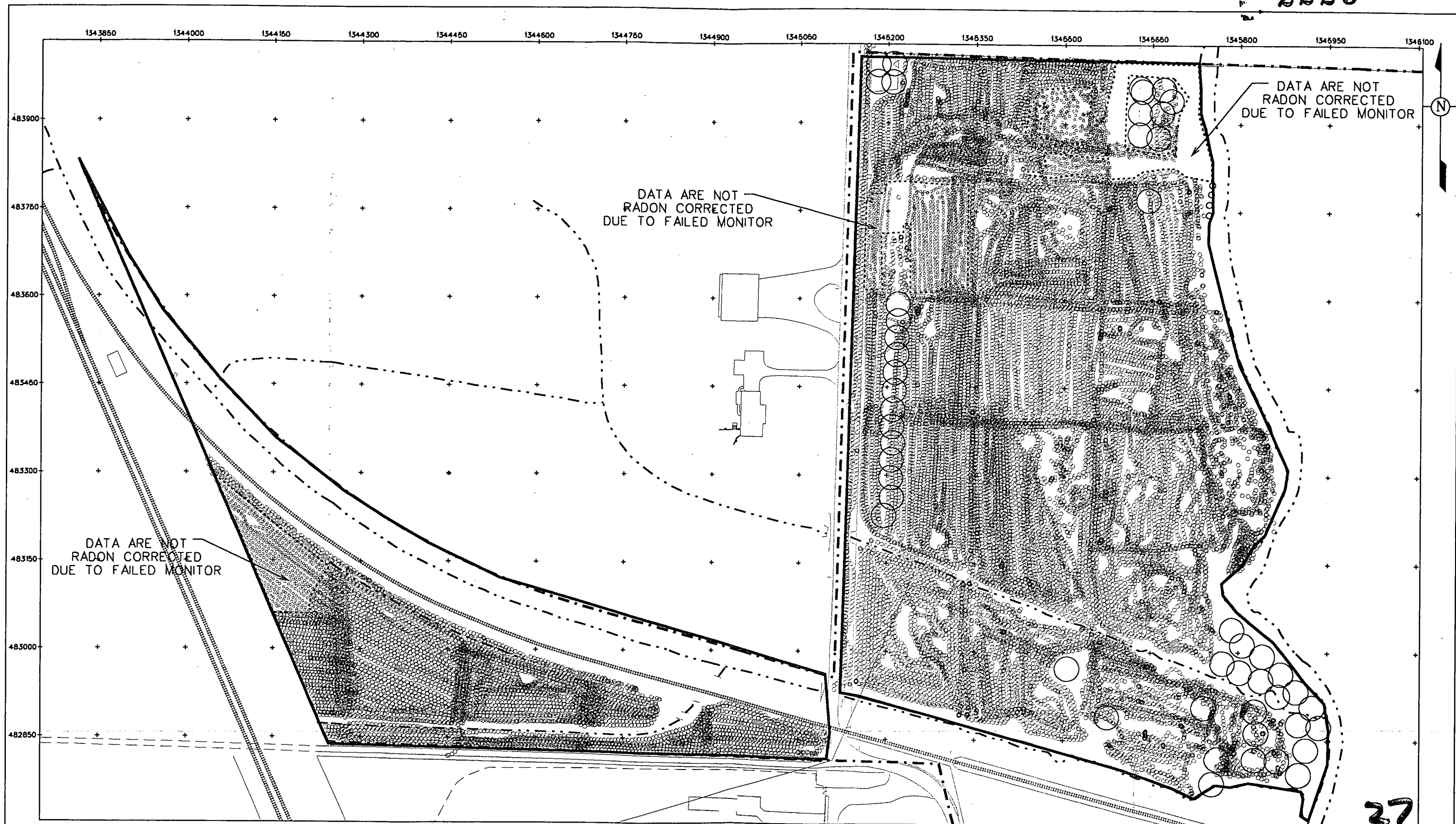


FIGURE 6. MOBILE NAI AND PHASE 1 HPGE THORIUM-232 RESULTS



LEGEND:

- | | |
|-------------------------------|-----------------------------------|
| ○ HPGE RESULT BELOW FRL | --- FEMP BOUNDARY |
| ● HPGE RESULT 1XFRL TO 3XFRL | ○ RTRAK/RSS RESULT BELOW THE FRL |
| ● HPGE RESULT > 3XFRL | ● RTRAK/RSS RESULT 1XFRL TO 3XFRL |
| (MAXIMUM RESULT = 1.25 pCi/g) | ● RTRAK/RSS RESULT > 3XFRL |
| | (MAXIMUM RESULT = 2.44 pCi/g) |

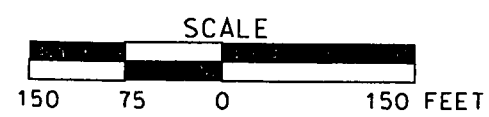


FIGURE 7. MOBILE NAI AND PHASE I HPGE RADIUM-226 RESULTS

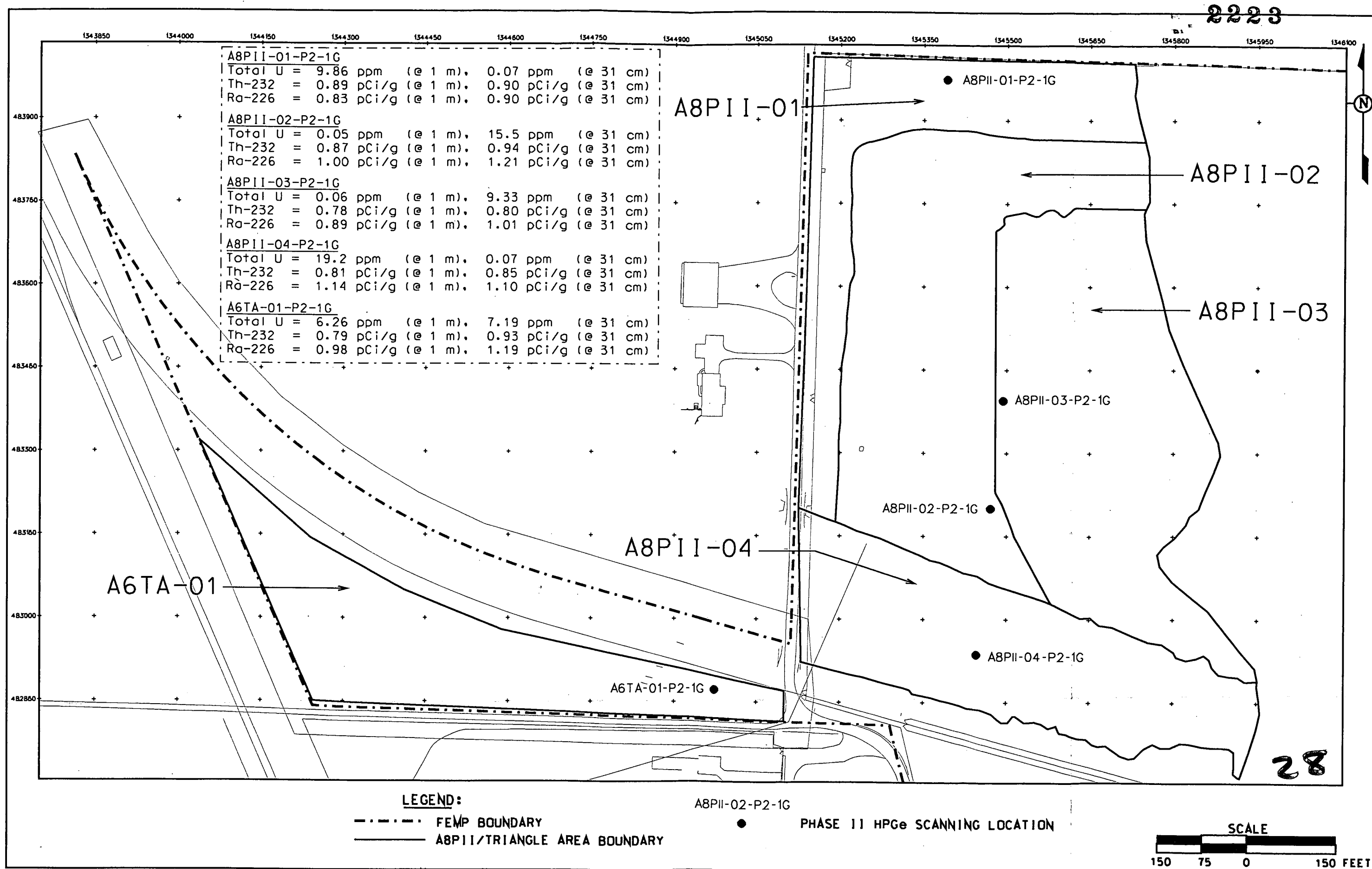


FIGURE 8. PRECERTIFICATION PHASE II HPGe LOCATIONS AND RESULTS

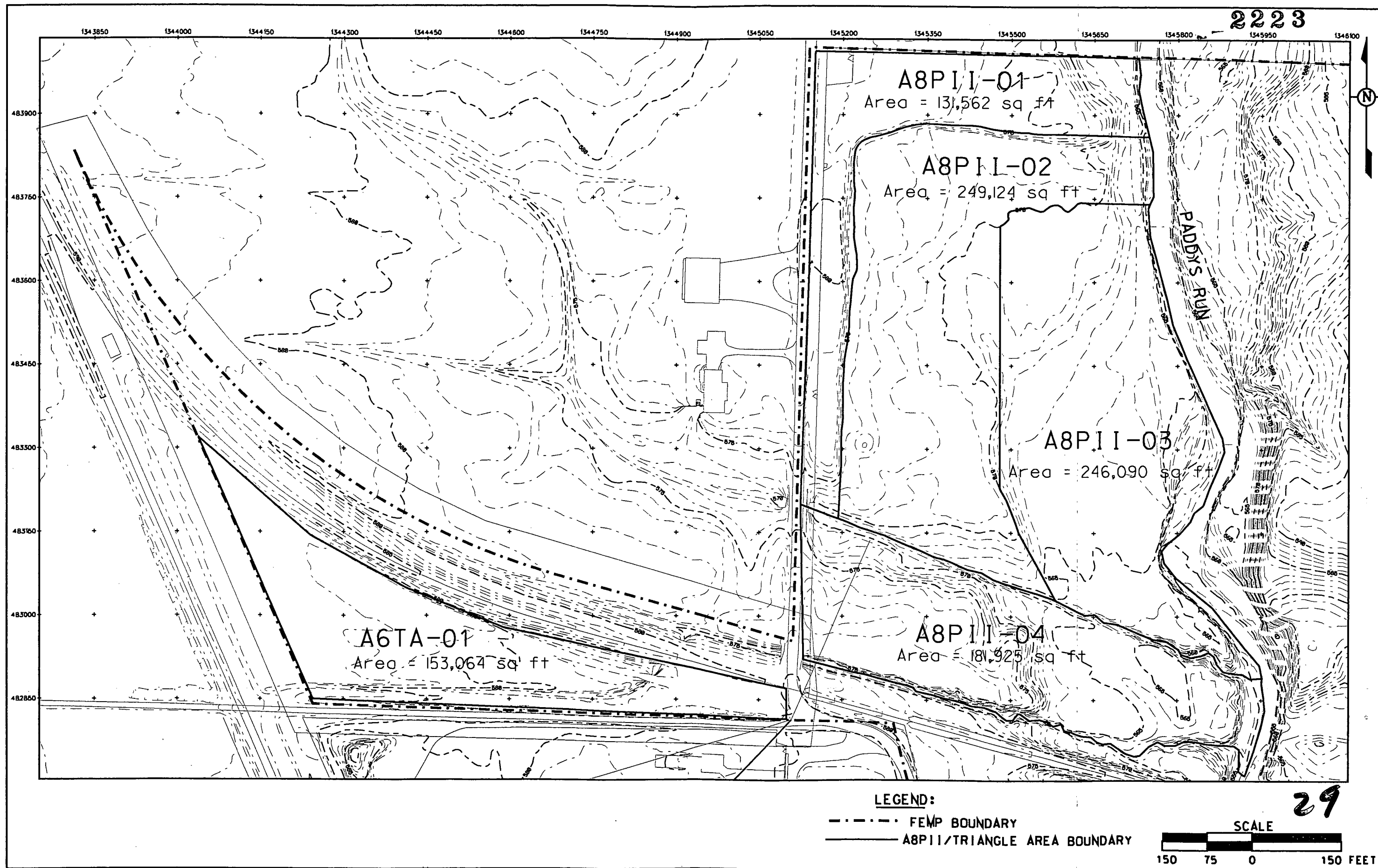


FIGURE 9. CERTIFICATION UNITS IDENTIFIED
 WITHIN A8P11 AND THE TRIANGLE AREA

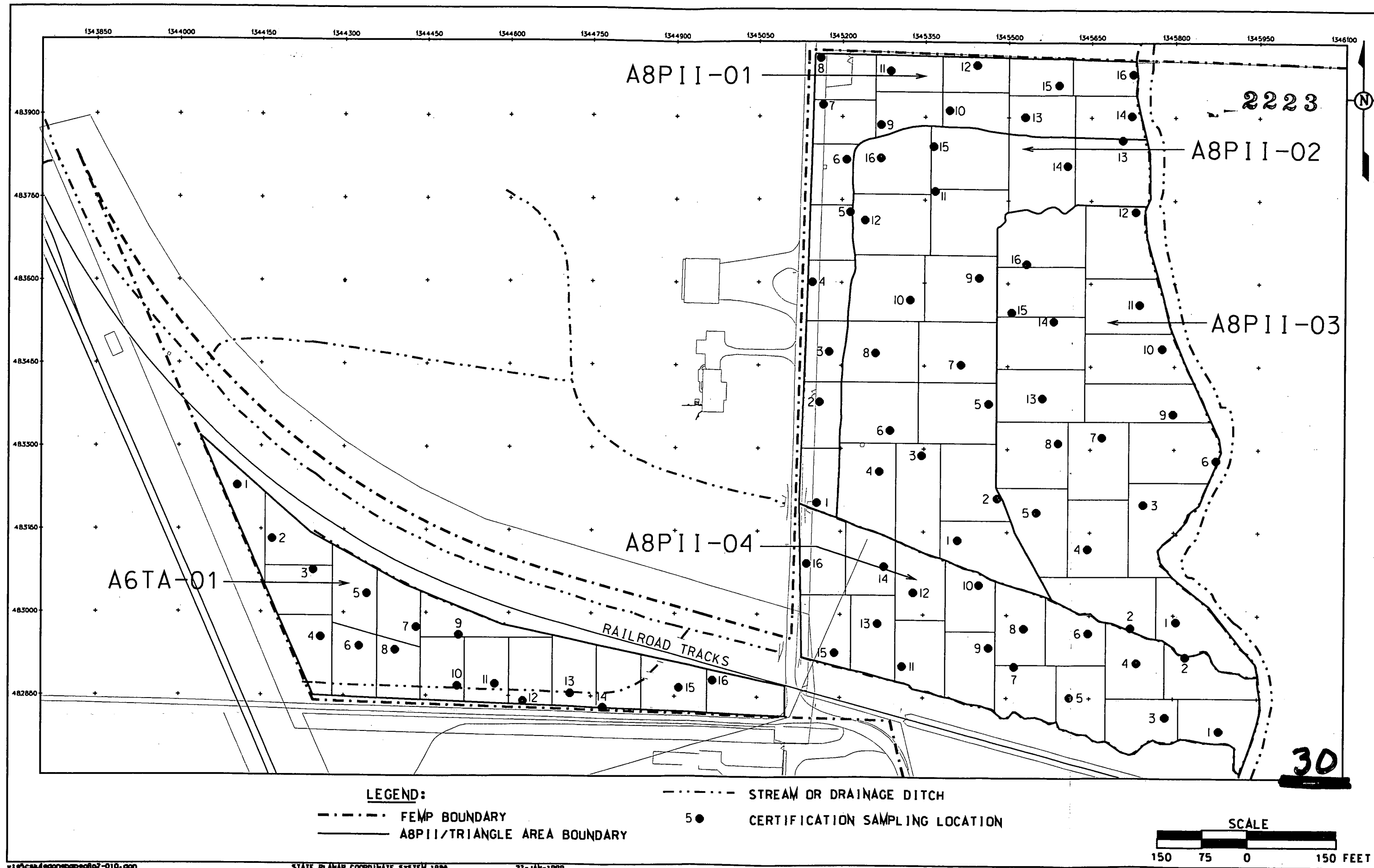


FIGURE 10. A8P11 AND TRIANGLE AREA SUB-CUS AND CERTIFICATION SAMPLING LOCATIONS